SUPPLEMENTAL
PHASE II STUDY

48-58 CHARLOTTE STREET
ROCHESTER, NEW YORK

Prepared for:	Mr. Joseph J. Biondolillo Environmental Specialist The City of Rochester 30 Church Street Rochester, New York 14614
Prepared by:	Day Environmental, Inc 2144 Brighton-Henrietta Town Line Road Rochester, New York 14623
Project No.:	1427S-97
Date:	December 15, 1997

TABLE OF CONTENTS

APPENDICES

1.0 INTRODUCTION

This report describes a Supplemental Phase II Study completed by Day Environmental, Inc. (DAY) in the vicinity of 48-58 Charlotte Street, City of Rochester, Monroe County (Site). A Project Locus is included as Figure 1 in Appendix A. DAY completed a Phase I Environmental Site Assessment (Phase I ESA) report (DAY File #1274E-97), dated May 15, 1997, that included the Site. As discussed in the Phase I ESA report, the Site was historically improved with residential houses, and later by an automobile parking lot. The Phase I ESA report did not identify any on-site environmental concerns for the Site; however, the Phase I ESA report identified historical uses of adjoining property as a potential environmental concern. An adjoining property (i.e., 42 Charlotte Street) located west of the Site is improved with a concrete block building which has been used in the past for auto repair.

Subsequently, a Phase II Study was performed, and DAY developed a Phase II Study report, dated September 30, 1997 (DAY File #1427S-97). Evidence of petroleum and/or volatile organic compound (VOC) impact, and a layer of heterogeneous fill, were encountered at the Site during the Phase II Study. The concentrations of some VOCs and metals detected in soil and/or groundwater samples from the Site exceeded their respective NYSDEC guidance values, recommended cleanup objectives, typical background ranges (i.e., for metals), or groundwater standards and/or guidance values. Elevated concentrations of "non-target" compounds (e.g., compounds associated with stoddard solvent/paint thinner, etc.) were detected at concentrations that appeared to warrant remediation and/or implementation of engineering controls. The extent of contamination in the saturated zone was generally delineated at the Site; however, the source of the detected contaminants at the Site was unknown.

As part of the September 30, 1997 Phase II Study report recommendations, it was recommended that additional studies be performed on and/or nearby the Site to further delineate the extent of contamination and assist in determining potential sources. This Supplemental Phase II Study was conducted in order to further address these recommendations.

1.1 Purpose

DAY understands that the Site, along with other adjoining and/or nearby properties located to the west of the Site in the same City block, may be redeveloped by the City of Rochester for residential purposes (i.e., homes that have full basements). As such, the purpose of this supplemental Phase II Study is to further delineate the extent of contamination and evaluate the potential sources of contamination.

2.0 EMFLUX PASSIVE SOIL GAS SURVEY

On October 16, 1997, 20 EMFLUX soil gas collector tubes (ET-1 through ET-20) were installed at the Site in the locations shown on Figure A included in Appendix A. DAY obtained the necessary soil gas collector tube kits from Quadrel Services, Inc. (Quadrel). The field procedures used to conduct this soil gas survey are included in Quadrel's November 12, 1997 report, which is included in Appendix B. DAY retrieved the EMFLUX soil gas collector tubes on October 20, 1997.

Analytical Testing

The EMFLUX soil gas collector tubes were delivered to Quadrel using chain-of-custody procedures. Based on the results of previous Phase II Studies at the Site, and uses of adjoining and neighboring sites, the EMFLUX soil gas collector tubes were analyzed by Quadrel for VOCs using United States Environmental protection Agency (USEPA) Method 8021 and for total petroleum hydrocarbons (TPH) using USEPA Method 8015B. Quadrel reported the seven most predominant VOCs detected in the samples and TPH.

EMFLUX test results are measured in nanograms/liter (ng/L), which corresponds to parts per trillion (ppt). Typical laboratory analysis of soil and groundwater samples are measured in micrograms/liter (ug/L) which corresponds to parts per billion (ppb). Thus, the EMFLUX soil gas survey methods used can detect contaminants in soil vapors at concentrations that are approximately 1,000 times lower than can be measured on soil or groundwater samples using conventional laboratory methods. Quadrel indicates that there is a ratio relationship that exists between the EMFLUX soil gas test results and the test results for conventional analysis of soil and gas samples (refer to the Quadrel report included in Appendix B).

As indicated in the Quadrel report included in Appendix B, there are site-specific variables that can disturb the EMFLUX test results. Site-specific variables include location of soil gas collector tubes relative to capped (e.g., paved) surfaces, soil type, etc. Thus, Quadrel indicates that the EMFLUX test results should be used to generally profile the distribution and relative strength of the contamination.

3.0 FINDINGS

A copy of Quadrel's report for the EMFLUX soil gas collector tube samples is included in Appendix B. As shown, BTEX VOCs (i.e., benzene, toluene, ethylbenzene, and xylenes), chlorinated VOCs (i.e., tetrachloroethene, 1,1,1-trichloroethane/1,2-dichloroethane, and trichloroethene), and/or TPH were detected in many of the soil gas survey EMFLUX soil gas collector tube field samples. The analytical test results are recorded in nanograms/liter (ng/L).

QA/QC Samples

Two QA/QC samples were collected as part of the EMFLUX study. One sample was a trip blank that was not opened. The other sample was opened and left at the site on the ground surface in order to evaluate ambient air conditions. With the exception of the chlorinated VOC tetrachloroethene detected at a concentration of 39 ng in a trip blank sample, no compounds were detected above quantitation levels in the QA/QC samples analyzed. Quadrel's report indicates that the detected concentration of tetrachloroethene in the trip blank was subtracted from the detected concentrations of the field and control samples during their interpretation of the data.

BTEX Test Results

BTEX VOCs were detected above quantitation levels in eight of the 20 EMFLUX soil gas collector tube field samples (refer to Figure A included in Appendix A). The total BTEX concentrations measured in the samples collected during this study ranged between 0.15 ng/L (i.e., ET-6) and 30.34 ng/L (ET-19). The highest BTEX concentrations measured were from soil gas points located south of the 36 and 42 Charlotte Street parcels (i.e., points ET-17 through ET-20) along Charlotte Street. Generally, lower concentrations of BTEX were detected at sample locations ET-1, ET-5, ET-6, and ET-9 along Haags Alley. BTEX was not detected above quantitation levels in samples that were collected on the Site itself (i.e., ET-11 through ET-16).

TPH Test Results

TPH was detected above quantitation levels in 12 of the 20 EMFLUX soil gas collector tube field samples (refer to Figure B included in Appendix A). Total TPH concentrations detected ranged between 0.56 ng/L (i.e., ET-12, ET-15, and ET-16) and 140.85 ng/L (ET-19). Generally, the highest TPH concentrations measured were from soil gas points located south of the 36 and 42 Charlotte Street parcels (i.e., points ET-17 through ET-20) along Charlotte Street. Some lower concentrations of TPH were detected at sample locations ET-6 through ET-9, ET-11, ET-12, ET-15, and ET-16. Locations ET-5 through ET-9 and ET-11 are located generally at or near the northern portion of the 36 and 42 Charlotte Street parcels. TPH was detected at on-site sample locations ET-11, ET-12, ET-15, and ET-16 at concentrations ranging between 0.56 ng/L and 0.84 ng/L.

An isopleth map using the TPH test results is included in Quadrel's report in Appendix B. As shown, the area of highest detected concentrations of TPH is located south of the 36 and 42 Charlotte Street parcels. TPH was also detected on the northern and southern portion of the Site and north of the 36 and 42 Charlotte Street parcels.

Chlorinated VOC Test Results

Chlorinated VOCs (e.g., tetrachloroethene, 1,1,1-trichloroethane/1,2-dichloroethane, and/or trichloroethene) were detected above quantitation levels in seventeen of the twenty EMFLUX soil gas collector tube field samples (refer to Figure C included in Appendix A). Total chlorinated VOC concentrations detected ranged between 0.13 ng/L (ET-20) and 6.63 ng/L (ET-1). The highest chlorinated VOC concentrations measured were from soil gas points located north and northwest of the Site along Haags Alley (i.e., points ET-1, ET-2, ET-8, and ET-9 located north of 14-16, 48-50, and 54 Charlotte Street) and on the Site itself (i.e., 1.65 ng/L at point ET-12). Some lower concentrations of chlorinated VOCs were detected at soil gas points ET-4, ET-10, ET-11, and ET-13 through ET-20. Total chlorinated VOCs were detected at on-site soil gas points ET-11 through ET-16 at concentrations ranging between 0.15 ng/L and 1.65 ng/L.

4.0 CONCLUSIONS AND RECOMMENDATIONS

A 20-point EMFLUX passive soil gas survey was conducted between October 16 and October 20, 1997 at, and in the vicinity of, the Site. Soil Gas survey laboratory results indicate that BTEX VOCs, TPH and chlorinated VOCs are present on and/or in the vicinity of the Site.

BTEX VOCs and TPH

The BTEX VOCs (i.e., benzene, toluene, ethylbenzene, and xylene) were detected at eight of the 20 soil gas survey points, and the highest detected concentrations were generally located at points south of the 36 and 42 Charlotte Street parcels (refer to Figure A included in Appendix A). BTEX was not detected in the six on-site samples, but was detected in some of the soil and water samples collected from test pits during the original Phase II Study. TPH (i.e., total petroleum hydrocarbon) was detected at twelve of the twenty soil gas survey points, and the highest detected concentrations were generally located at points south of the 36 and 42 Charlotte Street parcels (refer to Figure B included in Appendix A). The detected concentrations of BTEX and TPH in this area were significantly higher than detected in other areas that were tested. The distribution and concentration gradient of detected BTEX VOCs generally corresponds with the distribution and concentration gradient of detected TPH.

The BTEX VOCs and/or TPH can be attributable to petroleum products that are used for fuels (e.g., gasoline, fuel oil, etc.), lubrication (engine oil, cutting oil, etc.), ingredients in paints (e.g., toluene, xylenes, etc.), paint solvents (e.g., mineral spirits), and dry cleaning solvents (e.g., stoddard solvent).

Based on information obtained during the Phase I ESA, potential sources of the BTEX and/or TPH include former automobile repair/automobile painting operations and commercial facilities located adjacent or nearby the Site (e.g., at 14-16, 36, and 42 Charlotte Street, the rear of 17-19 and 31 Richmond Street, etc.). Additionally, there are some potentially upgradient off-site sources, including 37 Charlotte Street (i.e., currently occupied by Gianavola's Trucking, formerly a fabrication shop for E.G. Snyder), and the former E.G. Snyder facility located on Scio Street, etc. Information obtained indicates storage tanks have been used on most of these nearby properties. It is also possible that spillage or unauthorized disposal of petroleum products on, or in the vicinity of, the Site could be the source of the contamination observed.

Based on the previous Phase II Study, the BTEX VOCs and TPH were detected in the saturated zone (i.e., in contact with the apparent water table) and are probably migrating in the groundwater. It is possible that BTEX VOCs and TPH either attributable to volatilization from groundwater or acting as a secondary source are also migrating in a vapor phase in the unsaturated zone and/or along preferential migration pathways (e.g., utilities, etc.). Also, there could be an accumulation effect of VOC/TPH vapors in proximity to paved areas (i.e., beneath roads, sidewalks, etc.).

Chlorinated VOCs

Chlorinated VOCs (i.e., tetrachloroethene, 1,1,1-trichloroethane/1,2-dichloroethane, and/or trichloroethene) were detected at seventeen of the twenty soil gas points, and the highest detected concentrations were generally located at points north of the nearby 14-16 Charlotte Street parcel (refer to Figure C in Appendix A). Based on the test results of the EMFLUX soil gas collector tube samples, other areas containing high concentrations of chlorinated VOCs include ET-12 (located on the Site) and ET-8 and ET-9 (located north of the Site). The distribution of detected chlorinated VOCs identified is more wide spread than that detected for BTEX VOCs and TPH.

It is possible that the chlorinated VOCs detected during this study could have originated from various sources. The chlorinated VOCs (i.e., tetrachloroethene, trichloroethene, and 1,1,1-trichloroethane/1,2-dichloroethane) can be attributable to solvents used for dry cleaning, metal and/or plastic cleaning, vapor degreasing, etc. Based on information obtained during the Phase I ESA, potential sources of such chlorinated VOCs include a nearby former/current dry cleaning business located at 537-529 East Main Street (i.e., north of 14-16 Charlotte Street), or former automobile repair/automobile painting operations and commercial facilities located adjacent or nearby the Site (i.e., at 14-16, 42 Charlotte Street, the rear of 17-19, and 31 Richmond Street, etc.). Also, based on information obtained during the Phase I ESA, solvent tanks were and/or are present at the dry cleaning business located at 527-529 East Main Street.

It is possible that chlorinated VOCs are migrating in the groundwater, in a vapor phase in the unsaturated zone, or along preferential pathways (e.g., utilities, etc.). Also, there could be an accumulation effect of VOC vapors in proximity to paved areas (i.e., beneath roads, sidewalks, etc.).

Since contamination has been detected on-site and off-site, and since it appears that there could be more than one source for the contaminants, additional studies/remedial activities are recommended prior to redevelopment of the Site. Based on the findings of the subsurface studies presented in DAY's September 30, 1997 Phase II Study report, and on the results of this passive EMFLUX soil gas survey, the following actions are recommended:

- Monitor nearby receptors (e.g., inside sewers, etc.) for the presence of VOC/TPH vapors and free product.

- Install at least three overburden/bedrock interface groundwater monitoring wells to evaluate groundwater quality, the presence or absence of free product, and groundwater flow direction at, and in the vicinity of, the Site. This information should assist in evaluating the potential source(s) of the contamination (e.g., off-site source vs. on-site source, etc.).

- Perform additional studies to further delineate the extent and actual concentrations of contamination.

- Determine the source(s) of contamination prior to assessing the need for and/or implementing any remedial actions.

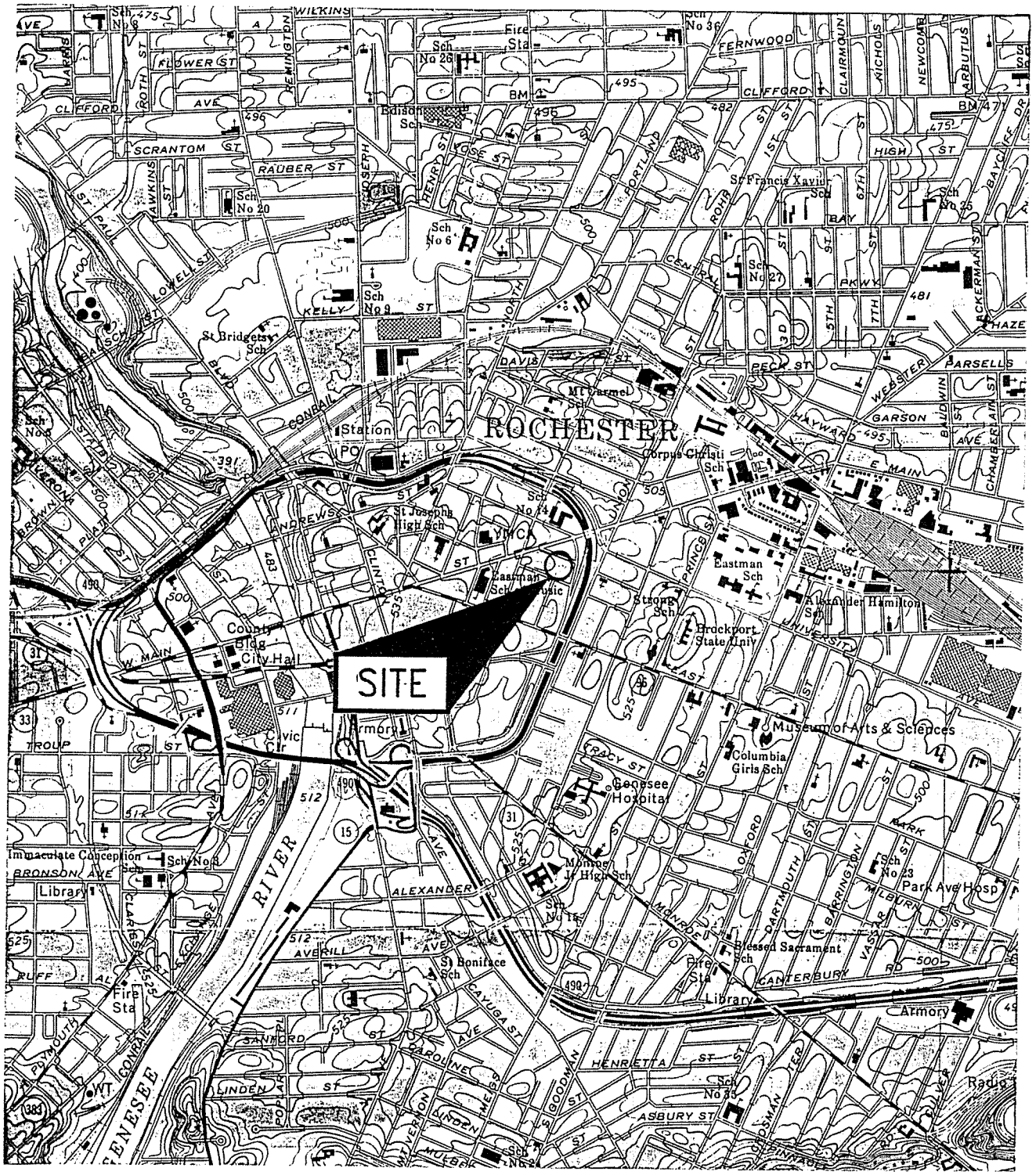
- If deemed necessary following subsequent studies, remediate impacted media at the Site to acceptable levels that are based on the anticipated future use of the Site and/or are acceptable to the appropriate regulatory agencies.

As described in DAY's September 30, 1997 Phase II Study report, the fill on the Site does not appear to represent an environmental concern requiring further evaluation and/or remediation based on the current use of the Site (i.e., vacant land). However, if the use of the Site will be changed (i.e., develop the Site for residential purposes), the recommended actions identified in DAY's September 30, 1997 Phase II Study report to further address fill that may contain elevated levels of metals should be implemented.

APPENDIX A

FILENAME: CHARL1

REF2: REF2
REF3: REF3



DRAWING PRODUCED FROM: ROCHESTER EAST, N.Y.
N4307.5–W7730/7.5
1971
PHOTOREVISED 1978

PROJECT NO. 1427S-97 FIGURE 1 SHEET 1 OF 1	PROJECT TITLE 48–58 CHARLOTTE STREET ROCHESTER, NEW YORK PHASE II STUDY DRAWING TITLE PROJECT LOCUS MAP	**DAY ENVIRONMENTAL, INC.** *ENVIRONMENTAL CONSULTANTS* *ROCHESTER, NEW YORK*	DATE 9/15/97 DRAWN BY SCALE 1" = 2000'

REF1: BORDER12
REF2: BAR30
REF3: REF3

LEGEND

—— —℄— —— PROPERTY LINE

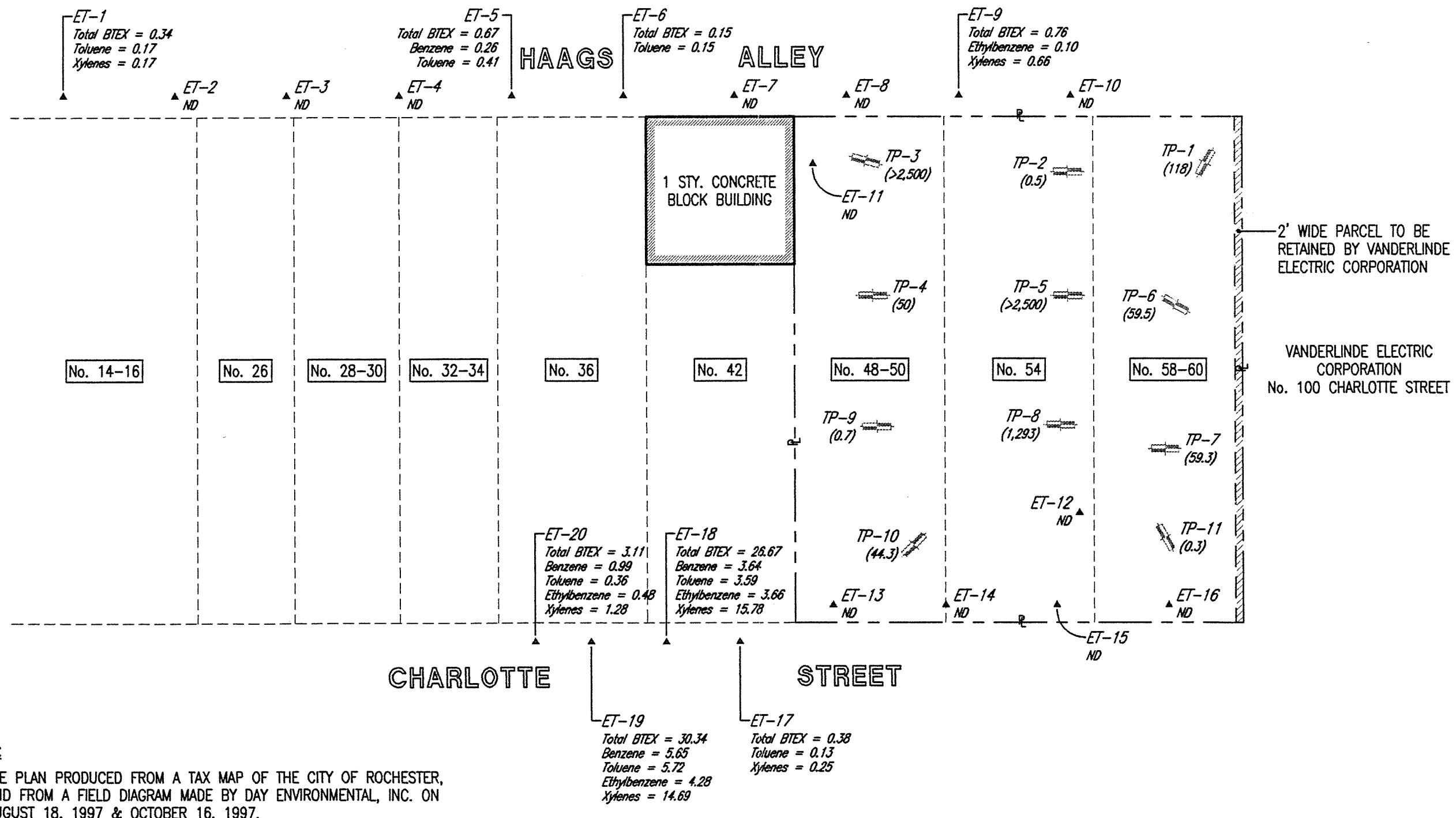
- - - - - - - - LOT LINE

TP-4 (50) TEST PIT LOCATION WITH PEAK PHOTOIONIZATION DETECTOR READING (PID) IN PARTS PER MILLION (ppm)

▲ ET-1 EMFLUX COLLECTION TUBE LOCATION WITH BTEX VOC RESULTS IN (ng/L)

ND NOT DETECTED ABOVE QUANTITATION LEVELS

No. 32-34 CHARLOTTE STREET ADRESSES



N

0 30 60

SCALE IN FEET

NOTES:

1. SITE PLAN PRODUCED FROM A TAX MAP OF THE CITY OF ROCHESTER, AND FROM A FIELD DIAGRAM MADE BY DAY ENVIRONMENTAL, INC. ON AUGUST 18, 1997 & OCTOBER 16, 1997.
2. LOCATIONS TAPE MEASURED FROM EXISTING SITE STRUCTURES AND SHOULD BE CONSIDERED ACCURATE TO THE DEGREE IMPLIED BY THE METHOD USED.

TIME PLOTTED: THUR.NOV.20,15:30:00,1997
FILENAME: C:\DRAWINGS\CHARL\CHARL3-1

FIELD VERIFIED BY JAD/JJD	DATE 10/16/97
DRAWN BY RJM	DATE DRAWN 11/18/97
SCALE 1"=30'	DATE ISSUED 11/20/97

DAY ENVIRONMENTAL, INC.
ENVIRONMENTAL CONSULTANTS
ROCHESTER, NEW YORK

PROJECT TITLE
48-58 CHARLOTTE STREET
ROCHESTER, NEW YORK
SUPPLEMENTAL PHASE II STUDY

DRAWING TITLE EMFLUX COLLECTION TUBE LOCATIONS WITH BTEX RESULTS

PROJECT NO.
1427S-97

FIGURE A

SHEET 1 OF 1

REF1: BORDER12
REF2: BAR30
REF3: REF3

LEGEND

—— —℄— —— PROPERTY LINE

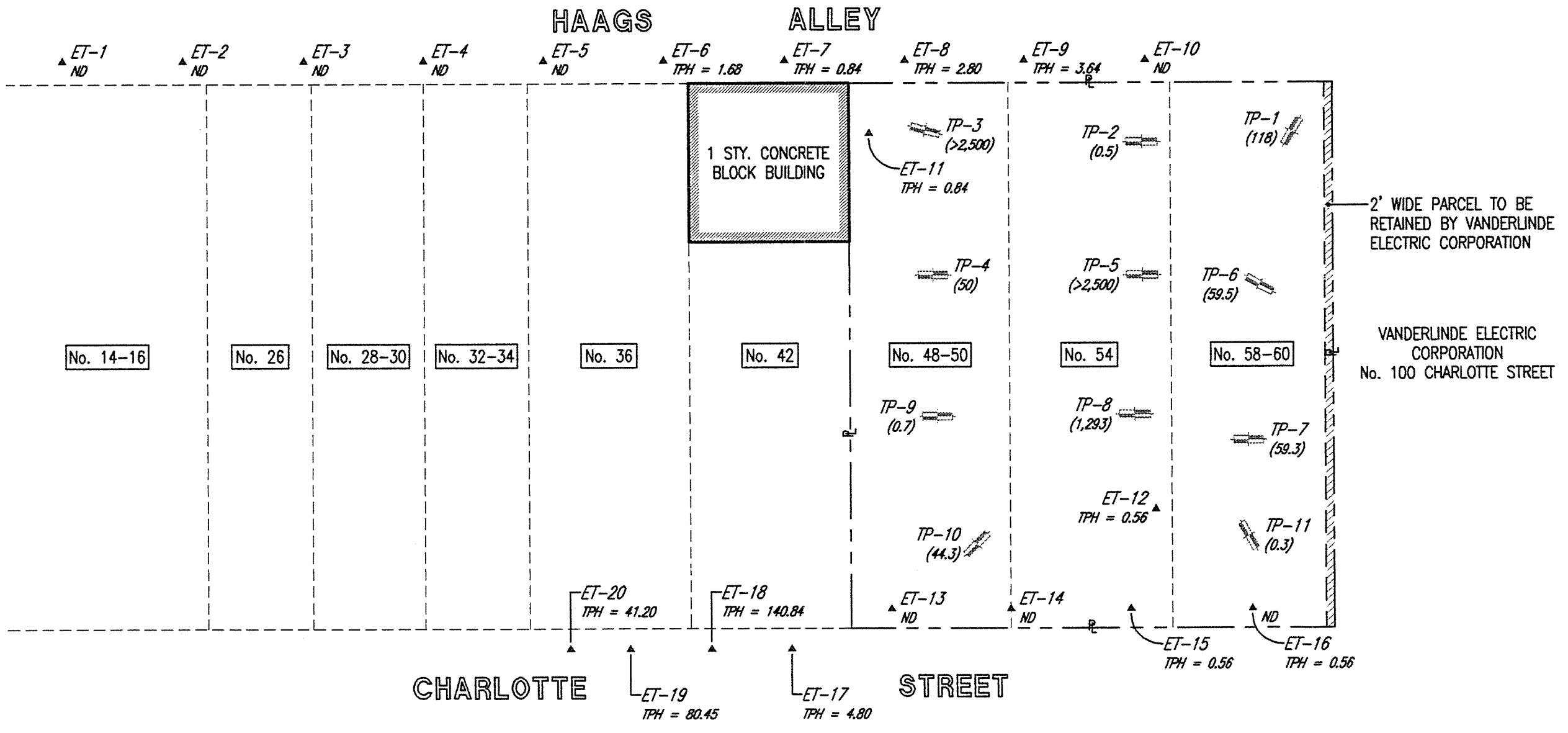
- - - - - - - - - LOT LINE

TP-4 (50) TEST PIT LOCATION WITH PEAK PHOTOIONIZATION DETECTOR READING (PID) IN PARTS PER MILLION (ppm)

▲ ET-1 EMFLUX COLLECTION TUBE LOCATION WITH TOTAL PETROLEUM HYDROCARBON (TPH) RESULTS IN (ng/L)

ND NOT DETECTED ABOVE QUANTITATION LEVELS

No. 32-34 CHARLOTTE STREET ADRESSES



NOTES:

1. SITE PLAN PRODUCED FROM A TAX MAP OF THE CITY OF ROCHESTER, AND FROM A FIELD DIAGRAM MADE BY DAY ENVIRONMENTAL, INC. ON AUGUST 18, 1997 & OCTOBER 16, 1997.
2. LOCATIONS TAPE MEASURED FROM EXISTING SITE STRUCTURES AND SHOULD BE CONSIDERED ACCURATE TO THE DEGREE IMPLIED BY THE METHOD USED.

0 30 60
SCALE IN FEET

FIELD VERIFIED BY JAD/JJD	DATE 10/16/97
DRAWN BY RJM	DATE DRAWN 11/18/97
SCALE 1"=30'	DATE ISSUED 11/20/97

DAY ENVIRONMENTAL, INC.
ENVIRONMENTAL CONSULTANTS
ROCHESTER, NEW YORK

PROJECT TITLE
48-58 CHARLOTTE STREET
ROCHESTER, NEW YORK
SUPPLEMENTAL PHASE II STUDY

DRAWING TITLE EMFLUX COLLECTION TUBE LOCATIONS WITH TPH RESULTS

PROJECT NO.
1427S-97

FIGURE B

SHEET 1 OF 1

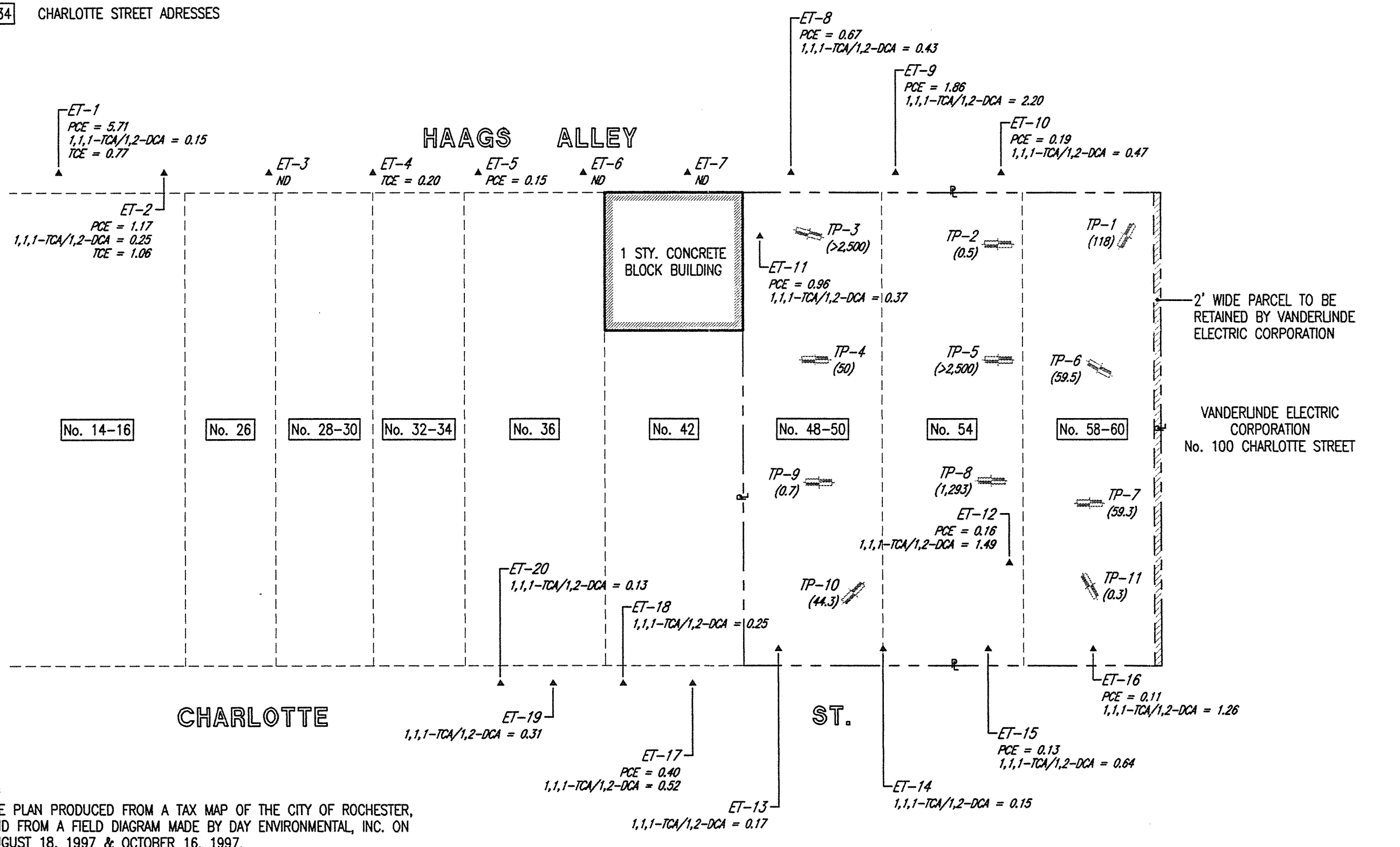
TIME PLOTTED: THUR.NOV.20,15:35:00,1997
FILENAME: C:\DRAWINGS\CHARL\CHARL3-2

REF1: BORDER12
REF2: BAR30
REF3: REF3

LEGEND

—— —℄— ——	PROPERTY LINE
- - - - - - - -	LOT LINE
TP-4 (50)	TEST PIT LOCATION WITH PEAK PHOTOIONIZATION DETECTOR READING (PID) IN PARTS PER MILLION (ppm)
▲ ET-1	EMFLUX COLLECTION TUBE LOCATION WITH CHLORINATED VOC RESULTS IN (ng/L)
No. 32-34	CHARLOTTE STREET ADRESSES

PCE	TETRACHLOROETHENE
1,1,1-TCA/1,2-DCA	1,1,1-TRICHLOROETHANE/1,2-DICHLOROETHANE
TCE	TRICHLOROETHENE
ND	NOT DETECTED ABOVE QUANTITATION LEVELS



NOTES:

1. SITE PLAN PRODUCED FROM A TAX MAP OF THE CITY OF ROCHESTER, AND FROM A FIELD DIAGRAM MADE BY DAY ENVIRONMENTAL, INC. ON AUGUST 18, 1997 & OCTOBER 16, 1997.
2. LOCATIONS TAPE MEASURED FROM EXISTING SITE STRUCTURES AND SHOULD BE CONSIDERED ACCURATE TO THE DEGREE IMPLIED BY THE METHOD USED.

TIME PLOTTED: THUR,NOV,20,15:45:00,1997
FILENAME: C:\DRAWINGS\CHARL\CHARL3-3

FIELD VERIFIED BY JAD/JJD	DATE 10/16/97	
DRAWN BY RJM	DATE DRAWN 11/18/97	
SCALE 1"=30'	DATE ISSUED 11/20/97	

DAY ENVIRONMENTAL, INC.
ENVIRONMENTAL CONSULTANTS
ROCHESTER, NEW YORK

PROJECT TITLE
48-58 CHARLOTTE STREET
ROCHESTER, NEW YORK
SUPPLEMENTAL PHASE II STUDY

DRAWING TITLE EMFLUX COLLECTION TUBE LOCATIONS WITH CHLORINATED VOC RESULTS

PROJECT NO.
1427S-97

FIGURE C

SHEET 1 OF 1

APPENDIX B

Quadrel Report No. QS2783

EMFLUX® Passive, Non-Invasive Soil-Gas Survey

HAAGS ALLEY/CHARLOTTE STREET SURVEY AREA
ROCHESTER, NEW YORK

Prepared for

Day Environmental, Inc.
2144 Brighton-Henrietta Town Line Road
Rochester, NY 14623

by

Quadrel Services, Inc.
1896 Urbana Pike
Suite 20
Clarksburg, MD 20871

November 12, 1997

Applying Results from Soil-Gas Surveys

The utility of soil-gas surveys is directly proportional to their accuracy in reflecting and representing changes in the subsurface concentrations of source compounds. A soil-gas survey, however, measures vapor-phase concentrations; and vapor-phase concentrations are never equivalent to the concentrations of their source compounds, essentially being dilute "extracts" of those compounds. As a matter of convenience, therefore, the units used in reporting volatile detections are usually smaller than those employed for source-compound concentrations. For example, where source concentrations are expressed in mg/kg (or parts per million), concentrations of the derivative gas may more conveniently be measured in nanograms per liter (parts per trillion).

The critical fact is that, whatever the relative concentrations of source and associated soil gas, best results are realized when the ratio of soil-gas measurements to actual subsurface concentrations remains as close to constant as the real world permits. It is the reliability and consistency of this ratio, not the particular units of mass (*e.g.*, nanograms) or units of concentration (*e.g.*, ng/L) that determine usefulness. Thus, Quadrel emphasizes the necessity of conducting -- at minimum -- follow-on intrusive sampling at one or two points which show relatively high EMFLUX® values to obtain corresponding concentrations of soil and ground-water contaminants. These correspondent values furnish the basis for approximating the required ratio. Once that ratio is established, it can be used in conjunction with EMFLUX® measurements (regardless of the units adopted) to estimate subsurface contaminant concentrations across the survey field. It is important to keep in mind, however, that specific conditions at individual sample points, including soil porosity and permeability, depth to contamination, and perched ground water, can have significant impact on soil-gas measurements at those locations.

When EMFLUX® Surveys are handled in this way, the data provide information which can yield substantial savings in drilling costs and in time. They furnish, among other things, a checklist of compounds expected at each survey location and help to determine how and where drilling budgets can most effectively be spent.

EMFLUX® Survey Number: QS2783

Haags Alley/Charlotte Street Survey Area
Rochester, New York

This EMFLUX® Soil-Gas Survey Report has been prepared for Day Environmental, Inc. (Day) by Quadrel Services, Inc. (Quadrel) in accordance with the terms of Purchase Order No. 1427S-97 dated October 10, 1997. Quadrel's principal technical contact at Day for this project has been Mr. Jeff Danzinger.

1. Objectives

To screen the Haags Alley/Charlotte Street Survey Area for the presence of targeted compounds in the gas phase. Results will be used to profile contamination in soil and/or ground water at the site, thereby determining the distribution and relative strength of detected contaminants.

2. Target Compounds

This survey targeted Total Petroleum Hydrocarbons (TPH) Volatiles and the 22 compounds listed in **Attachment 1.** The resulting laboratory data in nanograms (ng) of specific compound per cartridge for TPH Volatiles and the seven most predominant compounds are provided in **Attachment 2.**

3. Survey Description

• No. of Field Sample Points:	20
• No. of Ambient-Air Control Samples:	1
• No. of Trip Blanks:	1
• Total No. of EMFLUX® Cartridges:	22

- Field sample locations are shown on **Figure 1.**

4. Field Work

Quadrel provided Day an EMFLUX® Field Kit with the equipment needed to conduct a 20-point EMFLUX® Soil-Gas Survey. Collectors were deployed on October 16, 1997 and retrieved October 20, 1997. **Attachment 3** describes the field procedures used. Individual deployment and retrieval times will be found in the Field Deployment Report (**Attachment 4**).

date, appears to be A/Z = 20.2 cm. Given these values, Quadrel has computed the value of the constant to be:

$$\begin{aligned} K &= 1/[D(A/Z)]\ sec/cm^3 \\ &= 1/[0.05(20.2)]\ sec/cm^3 \\ &= 1/1.01\ sec/cm^3 \\ &\approx 1.0\ sec/cm^3 \end{aligned}$$

- **Data Compatibility Equation**. It is important to note that when sample locations are covered with or near the edge of an artificial surface (*e.g.*, asphalt or concrete), sample measurements are often distorted (increased) significantly. Such distortion can be attributed to the fact that gas rising from sources beneath impermeable caps tends to reach equilibrium in relatively short periods of time and that, once equilibrium is reached, the soil-gas concentration measured at any point in a vertical line between source and cap is theoretically the same. Thus, a reading taken immediately below an impermeable surface is much higher than it would be in the absence of such a cap.

  Typically, when an EMFLUX® Survey is performed on a site which is partially covered by an impermeable cap, the values recorded beneath or near the edge of a cap should be arithmetically adjusted for comparison with values recorded in uncapped areas. To make such corrections, the following equation should be used.

$$C_{(e)} = C_{(c)}Z_{(c)}/Z_{(s)}$$

  where: $C_{(e)}$ = Estimated *uncapped* measurement (ng)
  $C_{(c)}$ = Measurement in Collector (ng)
  $Z_{(c)}$ = Depth of Collector (cm)
  $Z_{(s)}$ = Known or assumed depth to source (cm)

  This calculation assumes that concentration gradients are linear with depth from source to surface, an assumption deemed acceptable by Quadrel on the basis of literature reviews and previous experience.

7. Report Notes and Quality Assurance/Quality Control Factors

- **Table 1** provides survey results in soil-gas concentrations by sample-point number and compound name. The quantitation levels (Q.L.) represent values above which quantitative laboratory results can be achieved within specified limits of precision and with a high degree of confidence. The quantitation level of each compound, therefore, provides a reliable basis for comparison of the relative strength of individual detections of that compound.

- The **Chain-of-Custody** form, which was shipped with the samples for this survey, is supplied as **Attachment 7**.

- **Laboratory QA/QC procedures** consist of control blanks and verifications, as well as system calibration, as specified for EPA Method 8021. Laboratory personnel conducted internal control blanks and internal control verification analyses daily to ensure that the system was contaminant free and properly calibrated. The system was calibrated using external-standard procedures to at least five different concentrations for each compound targeted.

- **QA/QC Contaminant Corrections.** Following EPA guidelines, Quadrel does not correct EMFLUX® laboratory data for method blank, trip blank, or ambient-air control sample contamination values; all contamination detected on QA/QC samples is reported in **Attachment 2**. Subsequent handling of QA/QC sample contamination depends upon the circumstances and origin of the sample; any corrective conventions noted below have, in Quadrel's experience, proved highly useful in deriving accurate and reproducible interpretations of survey data. *No other methods thus far tested have produced comparable levels of quality.*

  Laboratory method blanks are run each day with project samples to identify contamination present in the laboratory. If contamination is detected on a method blank, detections of identical compounds on samples analyzed the same day are considered to be suspect and are flagged both in the laboratory report and in converted soil-gas concentration data. The laboratory method blanks analyzed in connection with the present samples revealed no contamination.

  The **trip blank** is an EMFLUX® cartridge prepared, transported, and analyzed with other samples but intentionally not exposed. Although reported in the laboratory data, contamination on this field QA/QC sample is subtracted from measurements of the same compounds on both field and control samples during data interpretation. Here, the trip blank (labeled Trip A in **Attachment 2**) recorded 39 ng of Tetrachloroethene.

  Control samples are field QA/QC samples which serve to identify compounds present in ambient air during deployment and retrieval of collection devices. During data interpretation, an average of the contamination found on the control samples is subtracted from measurements of the same compounds on field samples prior to their conversion to soil-gas concentrations; however, the control sample (trap A in **Attachment 2**) did not record any of the targeted compounds, indicating that ambient air is not the source of detected contamination.

- **Survey findings** are relative exclusively to this project and should not routinely be compared with results of other EMFLUX® Surveys. *To establish a relationship between reported soil-gas concentrations and actual subsurface contaminant concentrations, which will indicate those detections representing significant subsurface contamination, Quadrel recommends the guidelines on the inside front cover of this report.*

- At the request of Day, an isopleth map showing detections of TPH Volatiles is provided as **Figure 2**.

- The following **Attachments** are included:

  -1- Quadrel's EPA Method 8021 Target Compound List
  -2- Laboratory Report
  -3- EMFLUX® Field Procedures
  -4- Field Deployment Report
  -5- Laboratory Procedures
  -6- Adsorbent Recovery Factors
  -7- Chain-of-Custody Form

QS2783hso

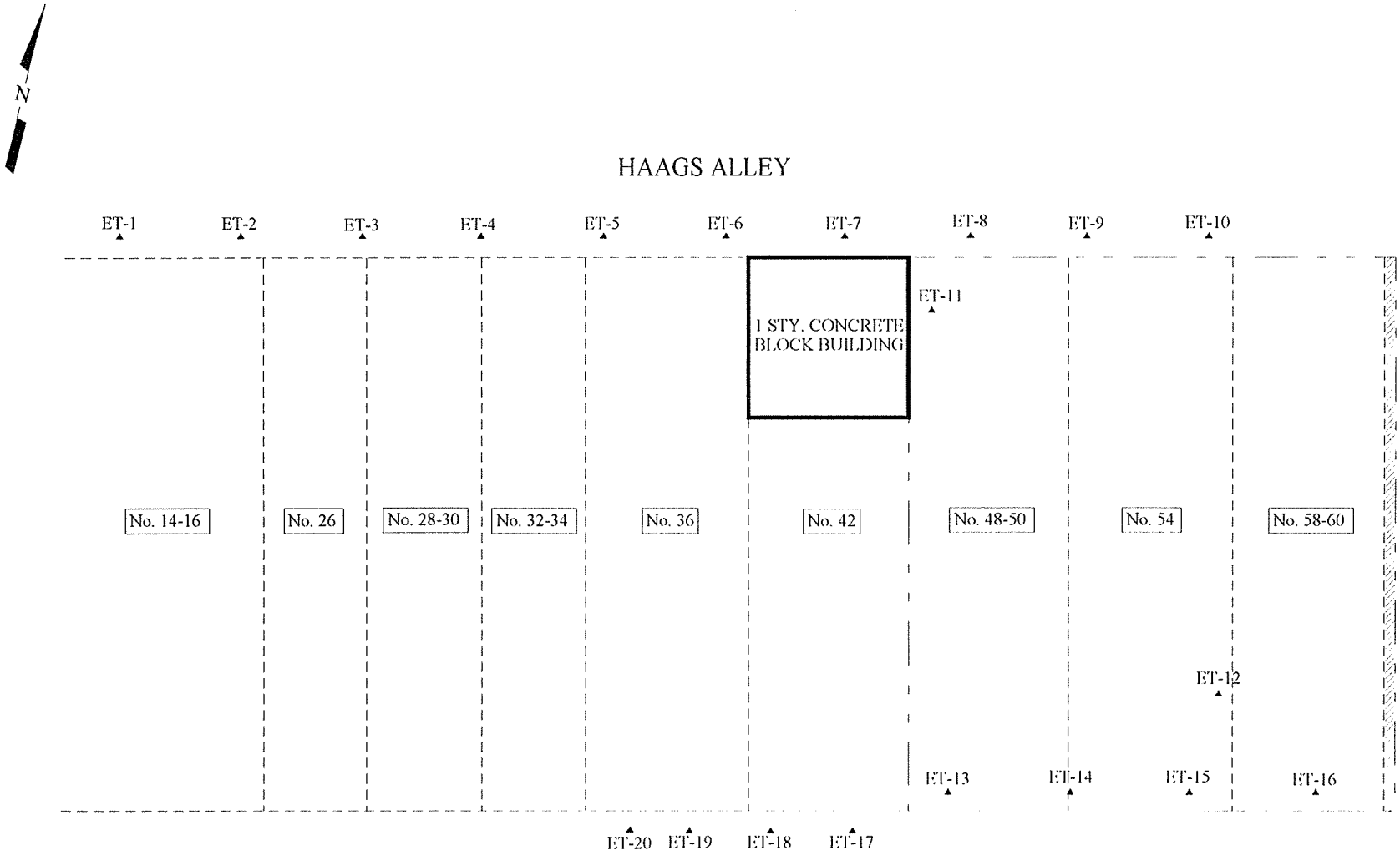


Figure 1
EMFLUX Sample Point Locations
48-58 Charlotte Street
Rochester, New York

1 ▲ EMFLUX Sample Point

Table 1

Soil-Gas Concentrations (ng/L)
Haags Alley/Charlotte Street
Rochester, New York

SAMPLE LOCATION	Q.L.	ET-1	ET-2	ET-3	ET-4	ET-5	ET-6	ET-7
CONTAMINANTS								
Benzene	0.10	--	--	--	--	0.26	--	--
Toluene	0.09	0.17	--	--	--	0.41	0.15	--
Ethylbenzene	0.09	--	--	--	--	--	--	--
Xylenes (total)	0.09	0.17	--	--	--	--	--	--
TOTAL BTEX	0.09	0.34	--	--	--	0.67	0.15	--
Tetrachloroethene	0.10	5.71	1.17	--	--	0.15	--	--
1,1,1-TCA/1,2-DCA	0.12	0.15	0.25	--	--	--	--	--
Trichloroethene	0.11	0.77	1.06	--	0.20	--	--	--
TPH Volatiles	0.42	--	--	--	--	--	1.68	0.84

SAMPLE LOCATION	Q.L.	ET-8	ET-9	ET-10	ET-11	ET-12	ET-13	ET-14
CONTAMINANTS								
Benzene	0.10	--	--	--	--	--	--	--
Toluene	0.09	--	--	--	--	--	--	--
Ethylbenzene	0.09	--	0.10	--	--	--	--	--
Xylenes (total)	0.09	--	0.66	--	--	--	--	--
TOTAL BTEX	0.09	--	0.76	--	--	--	--	--
Tetrachloroethene	0.10	0.67	1.86	0.19	0.96	0.16	--	--
1,1,1-TCA/1,2-DCA	0.12	0.43	2.20	0.47	0.37	1.49	0.17	0.15
Trichloroethene	0.11	--	--	--	--	--	--	--
TPH Volatiles	0.42	2.80	3.64	--	0.84	0.56	--	--

NOTES:

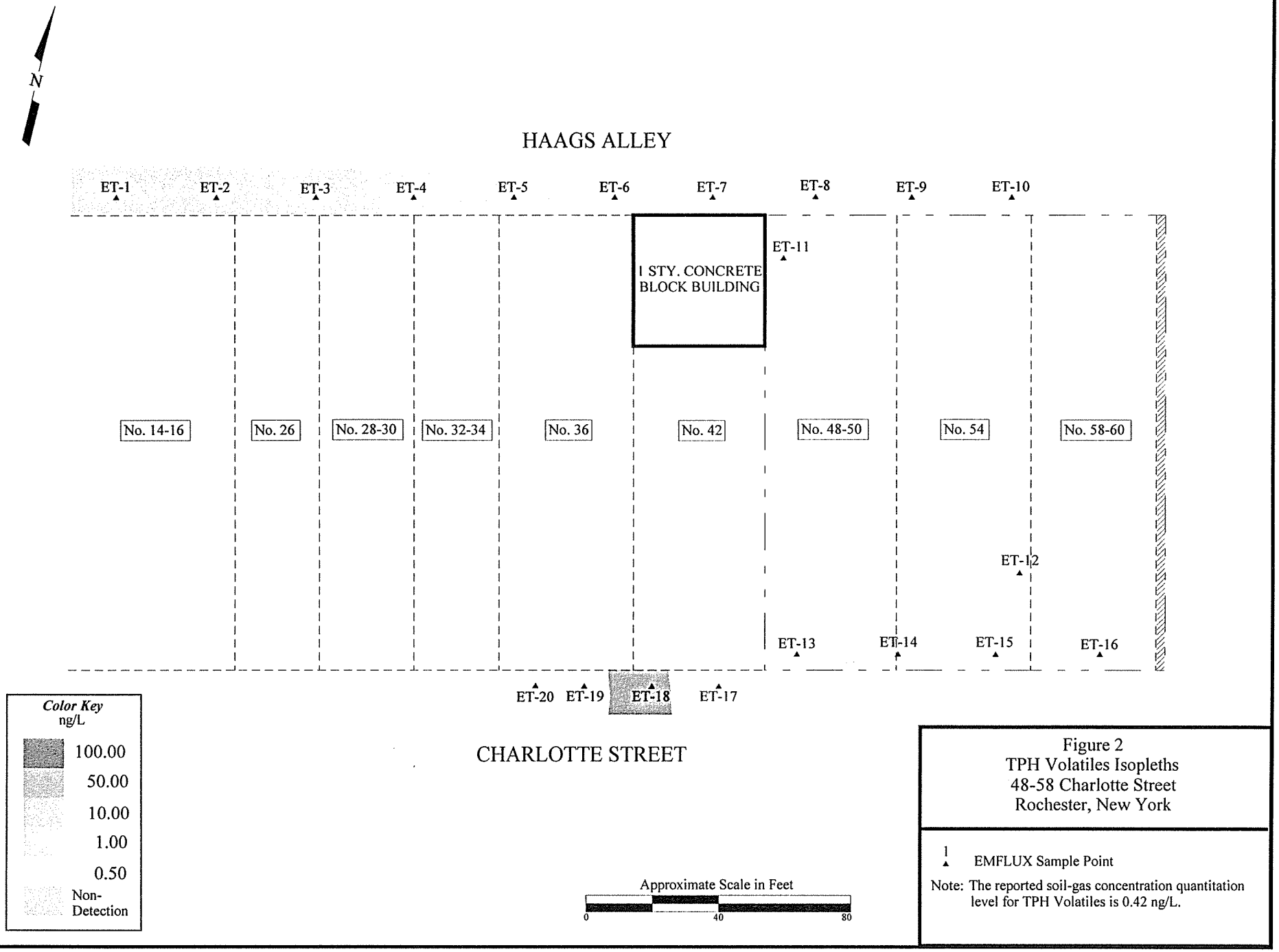
1) Values listed under "Q.L." are reported soil-gas concentration quantitation levels.

2) "--" denotes absence of detections above the reported quantitation level.

Table 1
(continued)
Soil-gas Concentrations (ng/L)
Hags Alley/Charlotte Street
Rochester, New York

SAMPLE LOCATION	Q.L.	ET-15	ET-16	ET-17	ET-18	ET-19	ET-20
CONTAMINANTS							
Benzene	0.10	--	--	--	3.64	5.65	0.99
Toluene	0.09	--	--	0.13	3.59	5.72	0.36
Ethylbenzene	0.09	--	--	--	3.66	4.28	0.48
Xylenes (total)	0.09	--	--	0.25	15.78	14.69	1.28
TOTAL BTEX	0.09	--	--	0.38	26.67	30.34	3.11
Tetrachloroethene	0.10	0.13	0.11	0.40	--	--	--
1,1,1-TCA/1,2-DCA	0.12	0.64	1.26	0.52	0.25	0.31	0.13
Trichloroethene	0.11	--	--	--	--	--	--
TPH Volatiles	0.42	0.56	0.56	4.80	140.84	80.45	41.20

NOTES:
1) Values listed under "Q.L." are reported soil-gas concentration quantitation levels.
2) "--" denotes absence of detections above the reported quantitation level.


N
HAAGS ALLEY
ET-1
ET-2
ET-3
ET-4
ET-5
ET-6
ET-7
ET-8
ET-9
ET-10
ET-11
1 STY. CONCRETE BLOCK BUILDING
No. 14-16
No. 26
No. 28-30
No. 32-34
No. 36
No. 42
No. 48-50
No. 54
No. 58-60
ET-12
ET-13
ET-14
ET-15
ET-16
ET-20
ET-19
ET-18
ET-17
CHARLOTTE STREET
Color Key
ng/L
100.00
50.00
10.00
1.00
0.50
Non-Detection
Approximate Scale in Feet
0
40
80
Figure 2
TPH Volatiles Isopleths
48-58 Charlotte Street
Rochester, New York
EMFLUX Sample Point
Note: The reported soil-gas concentration quantitation level for TPH Volatiles is 0.42 ng/L.

Attachment 1

Quadrel's EPA Method 8021 Target Compound List

Benzene	*trans*-1,3-Dichloropropene
Bromoform	Ethylbenzene
Carbon Tetrachloride	Methylene Chloride
Chlorobenzene	Styrene[2]
Chloroform	1,1,2,2-Tetrachloroethane
1,1-Dichloroethane	Tetrachloroethene (PCE)
1,2-Dichloroethane[1]	Toluene
1,1-Dichloroethene	1,1,1-Trichloroethane[1]
cis-1,2-Dichloroethene	Trichloroethene (TCE)
trans-1,2-Dichloroethene	o-Xylene[2]
cis-1,3-Dichloropropene	m+p-Xylenes

[1,2] Compounds noted can coelute.

Attachment 2

Laboratory Report

Attachment 2

Laboratory Report
Results in Nanograms (ng)
Analysis Completed: October 30, 1997

Quadrel Project No. QS2783

In this analysis 22 EMFLUX samples were analyzed under the requirements of EPA Method 8021/8015B using an SRI 8610 Gas Chromatograph equipped with a thermal desorber and photoionization, dry electrolytic and flame ionization detectors.

SAMPLE NO.	ET-1	ET-2	ET-3	ET-4	ET-5	ET-6	ET-7	ET-8
COMPOUNDS								
Benzene	U	U	U	U	77	U	U	U
Toluene	57	U	U	U	137	49	U	U
Ethylbenzene	U	U	U	U	U	U	U	U
m & p- Xylene	57	U	U	U	U	U	U	U
o- Xylene	U	U	U	U	U	U	U	U
TPH Volatiles	U	U	U	U	U	600	300	1,000
1,1,1-TCA/1,2-DCA	38	63	U	U	U	U	U	110
Trichloroethene	219	301	U	57	U	U	U	U
Tetrachloroethene	1,788	398	U	62	86	51	46	246

Reported Quantitation Level = 30 nanograms (for specific compounds)
Reported Quantitation Level = 150 nanograms (for TPH Volatiles)
U = Below Reported Quantitation Level

Attachment 2
(continued)

Laboratory Report
Results in Nanograms (ng)
Analysis Completed: October 30, 1997

Quadrel Project No. QS2783

SAMPLE NO.	ET-9	ET-10	ET-11	ET-12	ET-13	ET-14	ET-15	ET-16
COMPOUNDS								
Benzene	U	U	U	U	U	U	U	U
Toluene	U	U	U	U	U	U	U	U
Ethylbenzene	33	U	U	U	U	U	U	U
m & p- Xylene	44	U	U	U	U	U	U	U
o- Xylene	186	U	U	U	U	U	U	U
TPH Volatiles	1,300	U	300	200	U	U	200	200
1,1,1-TCA/1,2-DCA	558	120	94	377	43	39	161	319
Trichloroethene	U	U	U	U	U	U	U	U
Tetrachloroethene	611	96	333	87	38	38	79	73

SAMPLE NO.	ET-17	ET-18	ET-19	ET-20	A	TRIP A
COMPOUNDS						
Benzene	U	1,070	1,661	290	U	U
Toluene	44	1,183	1,885	120	U	U
Ethylbenzene	U	1,192	1,394	155	U	U
m & p- Xylene	33	2,184	2,992	112	U	U
o- Xylene	52	3,240	2,055	327	U	U
TPH Volatiles	1,700	49,900	28,500	14,600	U	U
1,1,1-TCA/1,2-DCA	132	63	78	32	U	U
Trichloroethene	U	U	U	U	U	U
Tetrachloroethene	161	U	33	53	U	39

Reported Quantitation Level = 30 nanograms (for specific compounds)
Reported Quantitation Level = 150 nanograms (for TPH Volatiles)
U = Below Reported Quantitation Level

Attachment 3

FIELD PROCEDURES FOR EMFLUX® SOIL-GAS SURVEYS

The following field procedures are routinely used during EMFLUX® Soil-Gas Surveys. Modifications can be and are incorporated from time to time in response to individual project requirements. In all instances, Quadrel adheres to EPA-approved Quality Assurance and Quality Control practices.

A. Field personnel carry EMFLUX® system components and support equipment to the site and deploy the EMFLUX® Collectors in a prearranged survey pattern. Although EMFLUX® Collectors require only one person for emplacement and retrieval, the specific number of field personnel required depends upon the scope and schedule of the project. Each Collector emplacement generally takes less than two minutes.

B. For those sample locations covered with soils or vegetation, a field technician clears vegetation and debris exposing the ground surface. Using a hammer and a ¾-inch-diameter pointed metal stake, the technician creates a hole approximately three inches deep. For those locations covered with an asphalt or concrete cap, the field technician drills a one-inch-diameter hole through the cap to the soils beneath. (If necessary, the Collector can be sleeved with a ¾-inch i.d. copper pipe for either capped or uncapped locations).

C. The technician then removes the solid plastic cap from an EMFLUX® Collector (a glass vial containing an adsorbent cartridge with a length of wire attached to the vial for retrieval) and replaces it with a Sampling Cap (a plastic cap with a hole covered by screen meshing). The technician inserts the Collector, with the Sampling Cap end facing down, into the hole (**see attached figure**). The Collector is then covered with either local soils for uncapped locations or, for capped locations, aluminum foil and a concrete patch. The Collector's location, time and date of emplacement, and other relevant information are recorded on the Field Deployment Form.

D. As a quality-control check during emplacement and retrieval, the technician takes periodic ambient-air control samples and records the date, time, and location of each. (One or more trip blanks are also included as part of the quality-control procedures).

E. Once all EMFLUX® Collectors have been deployed, field personnel schedule Collector recovery (approximately 72 hours after emplacement) and depart, taking all no-longer-needed equipment and materials with them).

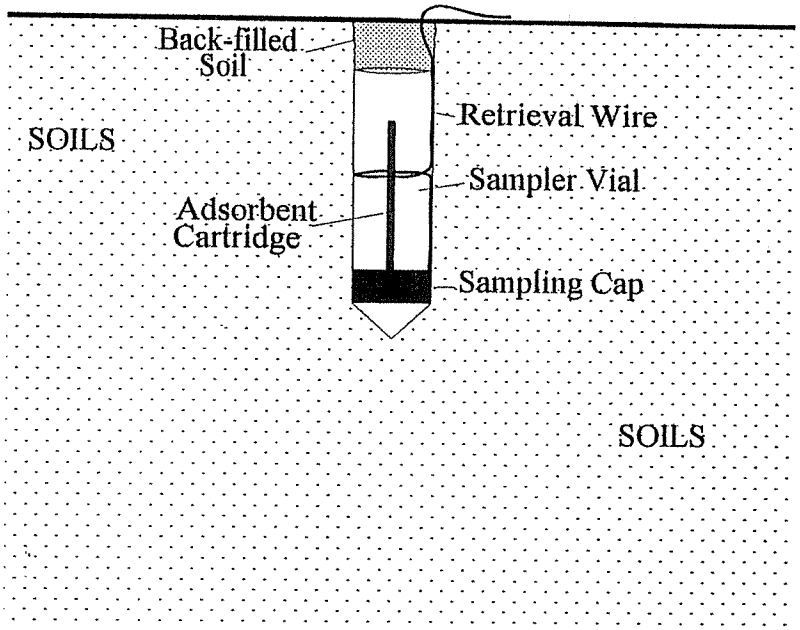
F. Field personnel retrieve the Collectors at the end of the 72-hour exposure period. At each location, a field technician withdraws the Collector from its hole and wipes the outside of the vial clean using gauze cloth; following removal of the Sampling Cap, the threads of the vial are also cleaned. A solid plastic cap is screwed onto the vial and the sample location number is written on the label. The technician then records sample-point location, date, time, etc. on the Field Deployment Form.

G. Sampling holes are refilled with soil, sand, or other suitable material. If Collectors have been installed through asphalt or concrete, the hole if filled to grade with a plug of cold patch or cement.

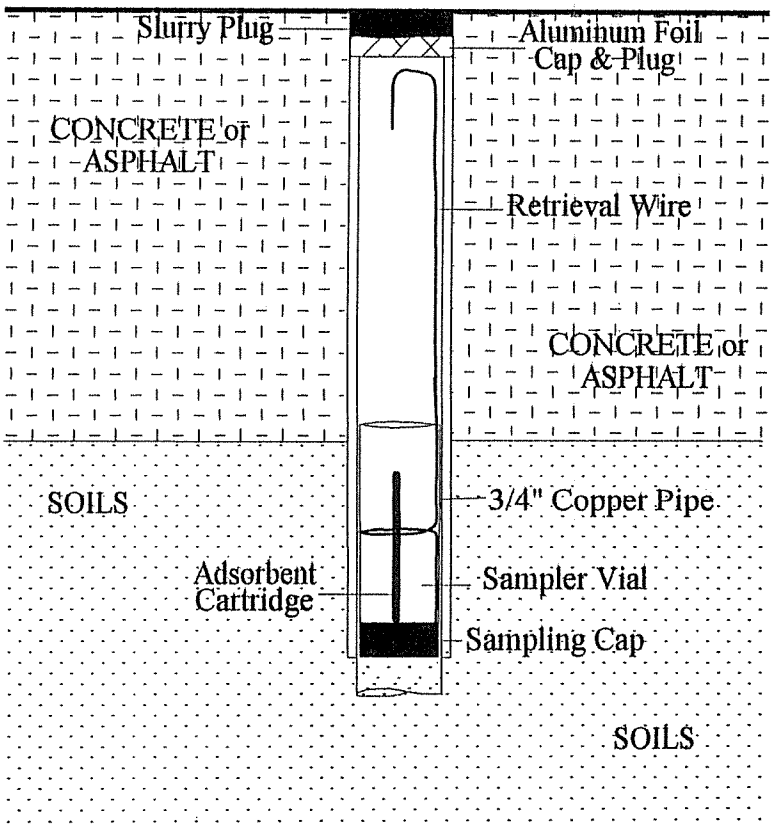
H. Following retrieval, field personnel ship or carry the EMFLUX® Collectors to analytical laboratories under contract to Quadrel Services. The remaining equipment is returned to Quadrel's preparation facility.

EMFLUX® COLLECTOR

DEPLOYMENT THROUGH SOILS



DEPLOYMENT THROUGH AN ASPHALT/CONCRETE CAP



Attachment 4

Field Deployment Report

QUADREL SERVICES, INC.
FIELD DEPLOYMENT REPORT

PROJECT #:	CLIENT:	SITE:
2783	Day Environmental, Inc.	Haags Alley / Charlotte St. Rochester, NY

INDIVIDUAL SAMPLE INFORMATION

EMPLACEMENT DATE: 10/16/97 RETRIEVAL DATE: 10/20/97

SAMPLE NUMBER	TIME		FIELD NOTES (e.g., asphalt/concrete covering, description of sample location, cartridge/vial condition)
	Emplaced	Retrieved	
ET-1	10:00	12:53	12" below asphalt 18" south of curbing / light rain in am
ET-2	10:03	13:00	
ET-3	10:07	13:09	
ET-4	10:10	13:19	
ET-5	10:16	13:26	
ET-6	10:21	13:32	NW cor. of bldg @ 42 Charlotte
ET-7	10:30	13:40	~ middle of bldg @ 42 charlotte. moisture in hole
ET-8	10:40	13:48	north of TP-3 moisture in hole
ET-9	10:49	13:54	north of TP-2
ET-10	11:00	14:00	
ET-11	11:30	14:14	NW corner of 48-58 Charlotte St. / Haags 13' 5'
ET-12	11:35	14:21	Middle of 48-58 near TP-8
ET-13	11:39	14:30	10' East of SW corner of 48-58 Charlotte 5' north of fence.
ET-14	11:44	14:35	30' east of ET-13
ET-15	11:48	14:41	" " " ET-14
ET-16	11:51	14:45	" " " ET-15
ET-17	12:21	14:48	15' west of SW corner of 48-58 12" south of sidewalk in pavement

SAMPLE NUMBER	TIME		FIELD NOTES (e.g., asphalt/concrete covering, description of sample location, cartridge/vial condition)
	Emplaced	Retrieved	
ET-18	12:25	14:50	35' west of prop. line in pavement
ET-19	12:30	14:54	55' west of prop line in pavement
ET-20	12:33	14:59	71' west of prop. line in pavement
A	12:30	14:54	collected at point # ET-19
Trip A	—	—	Do not open

Attachment 5

LABORATORY PROCEDURES FOR EMFLUX® ADSORBENT CARTRIDGES

Following are laboratory procedures used with the EMFLUX® Soil-Gas System, a screening technology for expedited site investigation. After exposure, EMFLUX® cartridges are analyzed using U.S. EPA Method 8015B/8021 as described in the Solid Waste Manual (SW-846) for screening purposes. This method, which is modified to accommodate thermal desorption screening of the adsorbent cartridges, uses a capillary gas chromatograph (GC) with a photo ionization detector (PID) in series with a sample splitter that sends half of the sample to a flame ionization detector (FID) and half to a dry electrolytic conductivity detector (DELCD). This procedure is summarized below:

A. EMFLUX® cartridges are placed in the thermal desorbtion chamber at ambient temperature, purged with carrier gas, then, desorbed at temperatures up to 400°C for five minutes. The analytes are cryofocused at the front of the GC column using liquid CO2. Analytes are detected with a PID then the sample is split to an FID and a DELCD.

B. The laboratory uses a 60-m, 0.53-mm-i.d., 5 μm-film-thickness MXT-5 capillary column for separation during analysis.

C. The PID, FID, and DELCD are set at high gain; the air pressure for the DELCD is set between two and three psi air; the air pressure for the FID is set at 10 psi.

D. Lab personnel conduct internal control blank and internal control verification analyses every 24 hours to ensure that the system is contaminant free and properly calibrated. The system is calibrated using the external standard calibration procedure to at least five different concentration levels for each compound targeted.

E. The instrumentation used for these analyses is an SRI 8610 Gas Chromatograph, connected to a PID in series with an FID and a DELCD and equipped with a thermal desorber.

Attachment 6

ADSORBENT RECOVERY FACTORS

Quadrel maintains an ongoing laboratory-based program to quantify recovery factors for the adsorbents used in EMFLUX® field collection devices. This program is designed to determine adsorbent affinity (a combination of attraction and retention characteristics) for a broad spectrum of compounds, including each of the VOCs targeted in this survey. The adsorbent with the highest overall affinity for the targeted VOCs was utilized for this survey, and the recovery factors of those compounds that were detected are as follows:

Compound	Percent Recovered
Benzene	83
Ethylbenzene	92
Toluene	93
Tetrachloroethene	86
1,1,1-TCA/1,2-DCA	71
Trichloroethene	80
Xylenes (total)	96
TPH Volatiles	100

Attachment 7

Chain-of-Custody Form

QUADREL SERVICES, INC.
CHAIN-OF-CUSTODY FORM

PROJECT NUMBER: 2783

PROJECT NAME: Supplemental Phase II Study

LOCATION: Haags Alley/Charlotte St., Roch., NY

CLIENT: Day Environmental, Inc

TARGET COMPOUNDS: 8021 / 8015 B

SAMPLE NUMBER	LAB ID No. (for lab use only)	REMARKS: Condition of sample or vial	Date	Time	Init.
ET-1		Good	10/20/97	12:53	
ET-2		Good		13:00	
ET-3		Good		13:09	
ET-4		Good		13:19	
ET-5		Good		13:26	
ET-6		Good		13:32	
ET-7		Good, moisture in hole		13:40	
ET-8		Good, moisture in hole		13:48	
ET-9		Good		13:54	
ET-10		Good		14:00	
ET-11		Good		14:14	
ET-12		Good		14:21	
ET-13		Good		14:30	
ET-14		Good		14:35	
ET-15		Good		14:41	
ET-16		Good		14:45	
ET-17		Cracked glass thread on vial		14:48	
ET-18		Good		14:50	
ET-19		Good		14:54	
ET-20		Good		14:59	
A		Good	↓	14:54	
Trip A		Good	—	—	
		End of Samples			

RELINQUISHED BY: Signature	RELINQUISHED BY: Printed Name	DATE	TIME	RECEIVED BY: Signature	RECEIVED BY: Printed Name
	Steve Thornley	10-14-97	1500	Fedex	
		10/16/97	0700		J. Joseph Dorety
	J. Joseph Dorety	10/21/97	1505	Fedex	
Fedex		10:22 AM	1100		Steve Thornley